ALGO FINDEV
ASSIGNMENT-2

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In our assignment-2 task, we were alloted keltner channel from the volatility indicator bucket and relative strength index from the momentum indicator bucket. To proceed with our assignment, we first imported the essential libraries, which were numpy, pandas, yfinance, and matplotlib. Then, we extracted the data for the stock from yfinance.

To analyze the results from backtesting, we varied the stock chosen. This was done to analyze the general trend which these indicators show together and alone, and not just the trend on a particular stock. Also the timeframe we chose was 10 years (14 June 2013 to 14 June 2023). The reason for the same is provided later in the documentation.

As an example, we have included only one case, but we can similarly analyze the other by changing the stock and dates in the cell where we have downloaded the data.

To analyze the returns from both strategies, we first coded the functions for both Keltner channel and relative strength index as follows:

- **Keltner channel**: To do so, we first drew the middle line, which is the exponential moving average of the price data; the length of the window we took was 20 days. Also, we drew the atr, which is the exponential moving average of the maximum difference between high price, low price, the difference of high price, close price, and the difference between low price and close price.

- **Relative strength index**: To do so, we first defined up prices and low prices, then calculated average gain and average loss, which were exponential moving averages of up prices and low prices, respectively, and then the rsi values were equal to

$$100-(100/1+(average\ gain/average\ loss))$$

SIGNAL GENERATION:

➔ **Keltner Channel**: When the price of stock exceeded the upper band value at a particular index, the signal generated was to SELL, and when the price of the stock fell short of the lower band value at a particular index, the signal generated was to BUY.

➔ **Relative strength index**: When the rsi values exceeded 70, the signal generated was to SELL, and when the rsi value fell short of 30, the signal generated was to BUY.

➔ **Combined Strategy**: To make a combined strategy, we generated BUY and SELL signals when both the Keltner channel and rsi conditions were simultaneously satisfied.

One important thing about our trading strategy is that we have tried to make it practically feasible. So while generating buy/sell signals, we have incorporated the fact that if more than one buy or more than one sell signals occur together, then we consider the first buy signal, or the first sell signal until a signal of opposite nature appears. Due to this the data points we obtained in a short timeframe were very less, and so we decided to implement this strategy on a 10 year time frame.

RESULTS FROM BACKTESTING:

● **APPLE STOCK**

The percentage return in case of keltner channel is: **160.44 %**

The percentage return in case of rsi is: **82.49 %**

The percentage return in case of combined strategy is: **143.15 %**

● **NVIDIA STOCK**

The percentage return in case of keltner channel is: **414.13 %**

The percentage return in case of rsi is: **155.56 %**

The percentage return in case of combined strategy is: **246.72 %**

OUR INFERENCES:

The percentage return obtained in case of keltner channel is way more than that in rsi in the stocks mentioned above, but we cannot generalize this statement because when we analyzed it for some more stocks, then we found a lot of variations. On implementing the strategy on google, we found that the percentage return obtained in case of keltner channel and rsi alone was roughly the same. However, on implementing the same strategy on netflix, we found that the percentage return obtained in case of rsi was way more (roughly 8 times) than that in keltner channel. So in our opinion, using both the indicators together is a much better alternative in real life since there is no guarantee that the returns would be positive in a short term. Hence, using the combined trading strategy gives a more chance of making profit as it incorporates both the signals.

Additionally, one more strategy we found to incorporate consecutive BUY or SELL signals is to only use 70% of the total money we have on each signal. Using this we can maximize the returns as we no longer need to ignore all BUY or SELL signals till a signal of opposite nature appears.